WE CLAIM:

1. Method for producing a light-emitting semiconductor component having a thin-film layer sequence (14), in which a photon-emitting active zone (17) is formed, comprising:

forming the thin-film layer sequence (14) on a growth substrate;

forming a reflection contact layer (40) having contact with the thin-film layer sequence (14);

applying a diffusion barrier layer (42) to the reflection contact layer (40);

applying a solder contact layer (44) to the diffusion barrier layer (42);

subjecting the reflection contact layer (40), after it has been formed and before the diffusion barrier layer (42) is applied, to heat treatment for producing an ohmic contact; and

cleaning the surface of the reflection contact layer (40) with a first etching solution after the heat treatment.

2. Method according to Claim 1,
wherein
the first etching solution is an acidic or basic solution.

3. Method according to Claim 1,
wherein
the reflection contact layer (40) is cleaned with the first etching solution for a time interval in the range of 10 seconds to 10 minutes.

4. Method according to claim 1,
wherein
the reflection contact layer (40) is subjected to heat treatment at a temperature in the range of 400°C to 600°C.

5. Method according to claim 1,
wherein
the reflection contact layer (40) is subjected to heat treatment for a time interval in the range of 1 minute to 20 minutes.

6. Method according to claim 1,
wherein
layers applied on the growth substrate are subsequently cleaned at least partly with a second etching solution.

7. Method according to Claim 6,
wherein
an aqueous HCl solution is used as the second etching solution.

8. Method according to Claim 1,
wherein
before the reflection contact layer is formed, an insulation layer (24) is applied to the thin-film layer sequence (14), at least one hole for through-plating purposes is formed in the insulation layer (24), and the reflection contact layer is formed on the insulation layer.

9. Method according to Claim 8,
wherein
a layer having at least one of the substances SiN_x, SiO_x, SiO_xN_y and Al_2O_3 is applied as the insulation layer (24).

10. Method according to Claim 1,
wherein
a layer which has or essentially comprises Au:Zn is applied as the reflection contact layer (40).

11. Method according to Claim 1,
wherein
a layer which has or essentially comprises TiW:N is applied as the diffusion barrier layer (42).

12. Method according to Claim 1,
wherein
a layer stack (50, 52, 54) which has or essentially comprises Ti, Pt and/or Au is applied as the solder contact layer (44).

13. Method according to Claim 1,
wherein
a layer sequence comprising at least the thin-film layer sequence and layers applied thereon is subsequently applied on a carrier substrate by the side on which the solder contact layer is applied, and the growth substrate is at least partly removed before or after the application of the layer sequence on the carrier substrate, in order to form a thin-film semiconductor component.

14. Method according to Claim 1,
wherein
at least one cavity (20) is formed in the thin-film layer sequence (14) on the side remote from the growth substrate, through which cavity a plurality of mesas (22) are formed at the boundary between carrier substrate (12) and thin-film layer sequence (14).

15. Method according to Claim 14,
wherein
the at least one cavity (20) is formed with a depth such that it cuts through the active zone (17) of the thin-film layer sequence (14).

16. Method according to Claim 1,
wherein
the thin-film layer sequence (14) is formed on the basis of $In_{1-x-y}Al_xGa_yP$ or on the basis of $In_{1-x-y}Al_xGa_yP$ and Al_aGa_bAs, where $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq a \leq 1$, $0 \leq b \leq 1$ and $x+y \leq 1$, $a+b \leq 1$.

17. Method for producing a light-emitting semiconductor component having a thin-film layer sequence (14), in which a photon-emitting active zone (17) is formed, comprising:

forming the thin-film layer sequence (14) on a growth substrate;

forming a reflection contact layer (40) having contact with the thin-film layer sequence (14);

applying a diffusion barrier layer (42) to the reflection contact layer (40); and

applying a solder contact layer (44) to the diffusion barrier layer (42);

wherein, after the solder contact layer (44) is applied to the diffusion barrier layer (42), the reflection contact layer (40) is subjected to heat treatment for producing an ohmic contact.

18. Method according to Claim 17,
wherein
layers applied on the growth substrate are subsequently cleaned at least partly with an etching solution.

19. Method according to Claim 18,
wherein
an aqueous HCl solution is used as the etching solution.

20. Method according to Claim 17,
wherein
before the reflection contact layer is formed, applying an insulation layer (24) to the thin-film layer

sequence (14), forming at least one hole for through-plating purposes in the insulation layer (24), and forming the reflection contact layer on the insulation layer.

21. Method according to Claim 20,
wherein
a layer having at least one of the substances SiN_x, SiO_x, SiO_xN_y and Al_2O_3 is applied as the insulation layer (24).

22. Method according to Claim 17,
wherein
a layer which has or essentially comprises Au:Zn is applied as the reflection contact layer (40).

23. Method according to Claim 17,
wherein
a layer which has or essentially comprises TiW:N is applied as the diffusion barrier layer (42).

24. Method according to Claim 17,
wherein
a layer stack (50, 52, 54) which has or essentially comprises Ti, Pt and/or Au is applied as the solder contact layer (44).

25. Method according to Claim 17,
wherein
a layer sequence comprising at least the thin-film layer sequence and layers applied thereon is subsequently applied on a carrier substrate (12) by the side on which the solder contact layer is applied, and the growth substrate is at least partly removed before or after the application of the layer sequence on the carrier substrate, in order to form a thin-film semiconductor component.

26. Method according to Claim 25,
wherein
at least one cavity (20) is formed in the thin-film layer sequence (14) on the side remote from the growth substrate, through which cavity a plurality of mesas (22) are formed at the boundary between said carrier substrate (12) and said thin-film layer sequence (14).

27. Method according to Claim 26,
wherein
the at least one cavity (20) is formed with a depth such that it cuts through the active zone (17) of the thin-film layer sequence (14).

28. Method according to Claim 17,
wherein
the thin-film layer sequence (14) is formed on the basis of $In_{1-x-y}Al_xGa_yP$ or on the basis of $In_{1-x-y}Al_xGa_yP$ and Al_aGa_bAs, where $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq a \leq 1$, $0 \leq b \leq 1$ and $x+y \leq 1$, $a+b \leq 1$.

29. Method according to Claim 2, wherein the first etching solution is one of the group of an aqueous HCl, H_2SO_4 and NH_3 solution.

30. Method according to claim 3,
wherein
the first contact layer (40) is cleaned for a time interval in the range of 3 minutes to 8 minutes.

31. Method according to claim 30,
wherein
the first contact layer (40) is cleaned for about 5 minutes.

32. Method according to claim 4,
wherein
the reflection contact layer (40) is subjected to heat treatment at a temperature about 450°C.

33. Method according to claim 5,
wherein
the reflection contact layer (40) is subjected to heat treatment for about 13 minutes.